

# Master of Science in Artificial Intelligence, Data Science, and Engineering

The Master of Science in Artificial Intelligence, Data Science, and Engineering is collaboratively hosted by the Departments of Computer Science & Engineering, Electrical Engineering, and Geomatics, all housed within the College of Engineering. This unique intersection of disciplines prepares students for the demands of our data-centric era. A master's degree in artificial intelligence, data science, and engineering instills a deep understanding of data-driven challenges and cultivates a skill set that includes critical thinking and the adept application of advanced concepts in solving real-world problems in the field.

## Admission Requirements

- Complete the Admission Requirements for Graduate Degrees (<https://catalog.uaa.alaska.edu/academicpoliciesprocesses/admissions/graduate/>).
- All students must hold a baccalaureate degree in engineering or a closely related discipline and submit to the UAA Office of Admissions:
  - Two letters of recommendation from professors or other professionals particularly qualified to attest to the applicant's qualifications for graduate study.
  - A resume or curriculum vitae.
  - A one-page personal statement discussing the applicant's credentials and readiness for graduate studies. This is an opportunity for the applicant to share relevant information, qualifications, and experience that would not be included with the UAA graduate application form or reflected on official transcripts. It is also the applicant's opportunity to describe their desire and commitment to pursue graduate study in artificial intelligence, data science, and engineering.

Current UAA baccalaureate students enrolled in engineering or a closely related discipline at the conclusion of their junior year may apply and be admitted to the Master of Science in Artificial Intelligence, Data Science, and Engineering (MS AIDE). Students must complete their baccalaureate degree requirements before receiving the MS AIDE.

## Accelerated Master of Science in Artificial Intelligence, Data Science, and Engineering Option

Students enrolled in the Bachelor of Science (BS) in Geomatics, BS in Computer Science (BSCS), BS in Computer Systems Engineering (BSCSE), or the BS in Electrical Engineering (BSEE) at UAA who are interested in pursuing an MS AIDE degree are encouraged to discuss the Accelerated MS in Artificial Intelligence, Data Science, and Engineering Option with their academic advisor(s) and plan on applying for admission to the MS AIDE during their junior year.

Students admitted to the Accelerated MS AIDE Option may apply up to nine (9) credits of 400-level coursework from their BS Geomatics, BSCS, BSCSE, or BSEE programs toward the graduation requirements of the MS AIDE. In addition to the admission requirements listed above, the Accelerated MS in Artificial Intelligence, Data Science, and Engineering Option applicant must:

- Be admitted to the BS Geomatics, BSCS, BSCSE, or BSEE at UAA.
- Have completed at least 60% of the credits toward the program requirements of the BS Geomatics, BSCS, BSCSE, or BSEE.
- Have a minimum grade point average (GPA) of 3.00 for all coursework completed at UAA.
- Have completed at least 24 credit hours at UAA.

## Graduation Requirements

- Complete the General University Requirements for Graduate Degrees. (<https://catalog.uaa.alaska.edu/graduateprograms/degree requirements/>)
- Complete the program requirements below.
- Choose and complete one of the three options below with approval in advance by the graduate advisor.

| Code                          | Title  | Credits  |
|-------------------------------|--|----------|
| <b>Core Courses</b>           |  |          |
| CSCE A615                     | Advanced Machine Learning  | 3        |
| CSCE A662                     | Advanced Data Mining   | 3        |
| ES A603                       | Fundamentals of Data Science and Engineering                         | 3        |
| GIS A658                      | Advanced Database Management Systems                                 | 3        |
| STAT A611                     | General Statistics for Data Science                                  | 3        |
| <b>Electives <sup>1</sup></b> |  | <b>9</b> |
| CSCE A601                     | Advanced Software Engineering  |          |
| CSCE A605                     | Advanced Artificial Intelligence                                     |          |
| CSCE A685                     | Advanced Computer and Machine Vision                                 |          |
| CSCE A690                     | Selected Topics in Computer Science and Computer Systems Engineering |          |
| CSCE/EE/GIS A695              | Professional Internship  |          |
| CSCE A698                     | Individual Research  |          |
| or EE A698                    | Individual Research  |          |
| or GIS A698                   | Individual Research  |          |
| EE A615                       | Energy Data Analytics  |          |
| EE A617                       | Advanced Green Electrical Energy Systems                             |          |
| EE A627                       | Smart Grids  |          |
| EE A637                       | Electrical Machines  |          |
| EE A675                       | Communication Networks   |          |
| GIS A666                      | Statistical Analysis for Geospatial Applications                     |          |

|                           |   |
|---------------------------|---|
| GIS A667                  | Digital Image Processing and Analysis           |
| GIS/EE A690               | Selected Topics in Data Science and Engineering |
| ME A672                   | Advanced Linear Systems                         |
| PM A601                   | Project Management Fundamentals                 |
| STAT A607                 | Advanced Time Series Analysis                   |
| Advisor Approved Elective |   |
| <b>Total</b>              | <b>24</b>                                       |

<sup>1</sup> All electives must be approved by the graduate committee/graduate advisor within the areas of computer science and computer engineering, electrical engineering, geomatics, or from another related area of study. Up to 9 credits of electives can be taken at the 400-level.

## Thesis Option

The Thesis Option requires 30 credits of coursework including 6 credits of thesis work completed in CSCE A699, or EE A699, or GEO A699. The completed thesis must meet the following requirements:

- The work must contribute to the body of knowledge in the candidate's field of graduate study. A literature review is required to show how the work is associated with the current state of the art in the candidate's field of graduate study.
- The thesis should be of sufficient quality that it is publishable in a peer-reviewed journal, as judged by the graduate committee.
- The work must demonstrate a command of knowledge and skills associated with the candidate's field of graduate study.
- The thesis proposal, submitted to the graduate committee at least one semester prior to the thesis defense, must present evidence that the above requirements will be satisfied and will generally consist of an explicit problem statement, a literature review, and one or more sections describing the research and the analytical methods that will be applied.
- The thesis must be defended by the student in an oral presentation to the student's graduate committee open to the public.

| Code         | Title  | Credits  |
|--------------|--------|----------|
| CSCE A699    | Thesis | 6        |
| or EE A699   | Thesis |          |
| or GEO A699  | Thesis |          |
| <b>Total</b> |        | <b>6</b> |

## Project Option

The Project Option requires 30 credits of coursework including 6 credits of a data science and engineering project in CSCE A698A, or EE A698A, or GEO A698.

The data science and engineering project will be conducted as an individual study and includes the following items that the student submits to the advisory committee:

- Project proposal to be approved by the graduate advisory committee.
- Draft project report to be reviewed by the graduate advisory committee. The report should consist of an introduction, literature review, methodology (if applicable), results, conclusions, recommendations, and references.
- Final project report incorporating suggestions and improvements as prescribed by the graduate advisory committee.

| Code         | Title   | Credits  |
|--------------|---------|----------|
| CSCE A698A   | Project | 3        |
| EE A698A     | Project | 3        |
| GEO A698     | Project | 3        |
| <b>Total</b> |         | <b>9</b> |

## Comprehensive Exam Option

The Comprehensive Exam Option requires 30 credits of coursework and a comprehensive exam to be administered in the final semester of study.

Prior to the exam, the student and the student's advisor will review the coursework completed by the student as part of the Graduate Studies Plan. Aspects of that review will be used to create an exam based on four of the courses completed during the program. The final decision on which courses are to be used for the exam will be made by the advisor.

The student and advisor will establish a period of time over which the exam will be taken. Additional requirements for the exam will be articulated to the student prior to the exam date.

| Code   | Title | Credits  |
|--|-------|----------|
| Additional 6 credits of advisor approved electives |       | 6        |
| Comprehensive Exam                                 |       |          |
| <b>Total</b>                                       |       | <b>6</b> |

A minimum of 30 credits is required for the degree.

## Program Student Learning Outcomes

Students graduating with a Master of Science in Artificial Intelligence, Data Science, and Engineering will be able to:

- Utilize advanced data engineering and analytical algorithms
- Demonstrate graduate-level theory in data science and engineering
- Apply graduate-level data science and engineering knowledge to the research work or projects
- Communicate and work effectively in a professional environment